Bioterrorism Agent Fact Sheet

Anthrax/*Baccillus anthracis*

Disease

Anthrax is a zoonotic disease rarely seen in the US that is caused by the gram-positive spore-forming bacterium *Bacillus anthracis*. This is considered one of the most likely agents to be used during a biological attack due to its ease to produce and disperse. There are three forms of anthrax:

- **Inhalational**
  Most lethal form (mortality > 80%) that occurs following inhalation of spores • Has not been reported in the US in over 20 yrs • Most likely type of the disease to occur in a bioterrorism incident • Identification of a single case should raise suspicion and prompt an investigation to rule out a possible bioterrorism event

- **Gastrointestinal**
  Rare, but highly fatal form that occurs after ingestion of contaminated meat • Potential, but less likely path of delivery during a bioterrorism event

- **Cutaneous**
  Most common form, usually manifested by a black, necrotic skin lesion

Diagnosis

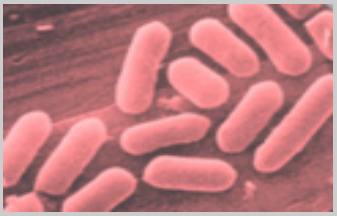
Presumptive diagnosis should be made based on signs and symptoms alone. Gram stain and culture of blood may demonstrate gram-positive bacilli, but these tests lack sensitivity and specificity until late in the disease process after development of bacteremia. Definitive culture identification of the bacillus as *B. anthracis* species may require > 24 hrs after initial detection, by which time the patient has likely died. Rapid PCR and ELISA tests are available at regional and national reference labs and are currently prepared to provide confirmation of suspected anthrax. To obtain lab specimen kits, initiate the reporting sequence by contacting your local health department.

Treatment

Treatment should be initiated as soon as diagnosis is suspected; never delay by waiting for confirmation testing. Prognosis is poor after symptom onset; even a delay of hours may lessen survival rate. The mortality rate for inhalational anthrax is 86 – 100% within 3 days if untreated before onset of symptoms.

Initiate treatment in patients with suspected infection, including those that present with symptoms in an area where other cases have been identified. Admit the patient to the hospital, initiate IV antibiotics, provide intensive supportive care and vaccinate. Most naturally occurring cases of anthrax are penicillin sensitive, but since it is probable that genetically altered highly resistant strains of anthrax will be encountered during a bioterrorism attack, initial treatment should be empiric until susceptibility testing is available.

Until sensitivities are known, treat as follows (including pregnant women and immunocompromised patients): Substitute doxycycline if unable to take ciprofloxacin. For confirmed cases, continue treatment for 8 weeks, switching to oral therapy upon clinical improvement and the patient's ability to eat and absorb medications.



Anthrax

Clinical Features of Inhalation Anthrax

Infection begins after spores are inhaled and deposited in the alveolar spaces of the lungs. Spores migrate to the mediastinum via lymphatics and begin to germinate into vegetative bacilli. Incubation period: 1-10 days, although there have been reported cases several weeks after exposure.

Typically, a two stage illness follows. Prodromal phase (lasting from a few hours to a few days): nonspecific flu-like symptoms including fever, dyspnea, nonproductive cough, mild chest discomfort, vomiting and malaise. Some patients experience a brief improvement or resolution of symptoms before progressing to the second phase.

Fulminant stage (usually progresses to death within 36 hrs): development of high-grade bacteremia characterized by fever, diaphoresis, respiratory distress, cyanosis and shock. Approximately half will develop hemorrhagic meningitis with concomitant headache, stiff neck and mental status changes. There are no specific laboratory tests associated with inhalational anthrax, but a widened mediastinum without infiltrates on CXR is highly suggestive in a young or otherwise healthy patient with a typical presentation.

Infection Control

Anthrax is not known to be transmitted person to person; only Standard Precautions are needed. Neither a private nor negative pressure room is needed. Laboratory personnel should be notified of known or suspected cases so that safe specimen processing can be undertaken (biosafety level 2 required).

- **Adults**
  ciprofloxacin 400mg IV q 12hrs or
  doxycycline 100mg IV q 12hrs

- **Children**
  ciprofloxacin 20-30mg/kg/day IV divided q 12hrs (not to exceed 1g/d) or
  doxycycline 2.5mg/kg IV q 12hrs for patients ≤ 45kg
  doxycycline adult dose for patients > 45kg

Subsequent cases following identification of strain resistance:
Initiate specific directed therapy. Penicillin is the drug of choice for penicillin-susceptible strains.

- **Adults**
  penicillin G 4 million U IV q 4hrs

- **Children**
  penicillin G 50,000 U/kg IV q 6hrs for children < 12 years of age
  penicillin adult dose for children ≥ 12 years of age

Alternative therapies include: gentamicin, erythromycin, clindamycin, chloramphenicol
Noneffective therapies include: trimethoprim, sulfamethoxazole, third generation cephalosporins

Post-Exposure Prophylaxis

Prophylaxis should be provided to all persons who may have been directly exposed to the initial release. It is critical that antibiotics be administered as soon as possible after potential exposure, before symptoms appear, as this offers the best chance of survival. Patient contacts (e.g., family, friends, healthcare providers) do not require prophylaxis.

- Initiate administration of vaccine if available

- Oral antibiotic therapy should be provided for 8 weeks; 4 weeks if vaccine is administered

- Ciprofloxacin 500mg po bid is the drug of choice; alternatives are doxycycline 100mg po bid or amoxicillin 500mg po q 8hrs

Vaccination

A licensed cell-free vaccine exists, but is currently not available to the general public unless there is a valid concern for anthrax exposure. The National Pharmaceutical Stockpile, which includes antibiotics and vaccine, can only be accessed through coordination between your state health department and CDC; the state health department will coordinate distribution with the local health department(s). The vaccination consists of an initial 6-dose series followed by an annual booster; all doses are to be given .5 ml SQ:

- Initial series: 0, 2 & 4 wks; 6, 12 & 18 months

- Booster doses are required annually to maintain immunity

- For those who received doses prior to exposure, provide a single booster unless the initial 3 dose series was completed within the previous 6 months

Additional information and references available at www.bioterrorism.slu.edu

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Decontamination

The highest risk of infection occurs during the initial release while a large concentration of anthrax spores remain airborne; in ideal conditions, this is estimated to be up to 1 day. Although the spores are incredibly hardy, surviving many years in the soil, cases resulting from secondary aerosolization have not been confirmed and are thought to be unlikely.

Decontamination of surfaces following an aerosol release may decrease the slight theoretical risk of secondary aerosolization, but is not recommended for large areas or buildings.

In addition to post-exposure prophylaxis, direct contact with suspected anthrax spores should be managed with thorough washing of exposed skin and clothing with soap and water; bleach is not necessary. All instruments used for invasive procedures (such as surgeries or autopsies) on patients with known or suspected anthrax should be sterilized with a sporicidal agent such as hypochlorite (bleach).

Reporting

Report suspected cases of inhalational anthrax or suspected intentional release of anthrax to your local health department. The local health department is responsible for notifying the state health department, FBI and local law enforcement. The state health department will notify the CDC.

Disclaimer

Information contained in this fact sheet was current as of February 2001, and was designed for educational purposes only. Medication information should always be researched and verified before initiation of patient treatment.

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